# The Diagnostic Assessment Tool for Restoration Strategies of Nananmangalam Urban Reserve Forest,Chennai,India

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**Abstract**— Major countries around the world have an untapped resource opportunity laying within their geographical region : the restoration of forest landscapes. "Forest landscape restoration" is the process of regaining ecological functionality and enhancing human well – being across cleared or degraded forest landscapes of the region. It can result in a variety of land use, ranging from vast tracts of dense natural forests,to high-yield agroforestry systems, to a mosaic of wooded areas amid productive agricultural fields or dense urban development like urban reserve forest, open space reserves, parklands, avenues, building setbacks etc. Forest landscape restoration does not call for increasing tree cover beyond what would be ecologically appropriate for a particular selected candidate landscape location.

The objective of this technical paper is to explore the use of "The Diagnostic Assessment Tool for restoration strategies of Nanmangalam urban reserve forest,Chennai,India ". Methodolgy of the tool consists of three questionnaire tabs (*Diagnostic - Motivate, Diagnostic - Enable, Diagnostic - Implement*) and a summary table called "Key Success Factors". The three questionnaire tabs help decision makers and restoration supporters analyze the existence of key success factors within a current or future restoration project.  In particular, it helps them focus their efforts on the most important factors to get in place before large amounts of human, financial, or political capital are invested. When applied periodically every few years once a restoration effort is underway, this tool can help implementers adjust and refine their policies and practices as a means of adaptive management.

**Index Terms**— Diagnostic-Motivation, Diagnostic- Enable, Diagnostic- Implement

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## 1 INTRODUCTION

Urbanization is one of the major reasons for destruction of the natural vegetation. The acceleration of urban construction and population growth changes the urban environment inspite of India being in the list of predominately active forest landscape restoration countires. The rapid growth of urban population and global climate change call for the elaboration and evaluation of different adaptation and mitigation strategies in this anthropogenic-modified climate circumstances that the well being of the Indian urban population through landscape planning and design especially for the rapidly growing metropolis of Chennai.

Chennai Metropolitan Area (CMA) records 3% in average annual rate of change of population size and Thirty Second in ranking of urban agglomeration with more than 5 million inhabitants as per WUP, 2014.Presently, Government of Tamil Nadu propose to expand Chennai Metropolitan Area from 1,189 Sq.km to 8,878 Sq.km, with an objective to counter the effect of ever-increasing population and to regulate development in fast–growing sub urban areas. To create infrastructure at par with economic activities, care for environmental protection and safeguarding fertile agricultural lands of the two districts of Kancheepuram,Tiruvallur  and Arakkonam Taluk of Vellore District . Due to expansion of the urban limits in the past decades, nearly 100 species of native trees and shrubs disappear from Chennai region.Today, the open space reserves and protected urban reserve forest in the city and sub-urban area are the only reserves available for forest landscape restoration of native tree stands and testimony to the endangered tropical dry evergreen forest type of this region.Hence,"Restoration Diagnostic Assessment Tool" will be an effective scientific method to regain ecological functionality and enhance human well – being across cleared or degraded forest landscapes of the city and its region.

## 2.1 LITERATURE REVIEW

History indicates that forest landscape restoration is possible in big and small ways. Many countries - including Costa Rica, Niger, South Korea, Sweden, Singapore, Thailand and the United States – have recovered the best possible forest landscape during the past century in a manner that could be considered "successful" in terms of being phenomenal and gearing up stakeholder benefits. Analysis from these and other historical case studies in all complemented from peer-reviewed literature suggests that a successful restoration process exhibits three common themes, they are as follows:

**2.1.1 A clear motivation**: Decision makers, land owners, and/or citizens were inspired or motivated to catalyse processes that led to forest landscape restoration.

**2.1.2 Enabling conditions in place**: A number of ecological, policy, social, and institutional conditions were in place that created a favourable context for forest landscape restoration.

**2.1.3 Capacity and resources for sustained implementation:** Capacity and resources were mobilized to implement forest landscape restoration on a sustained basis on the ground.

Within each theme, this research paper points to a number of factors that were present- either naturally or through human action-in case where forest landscape restoration occurred. We call these as "Key Success Factors" for forest landscape restoration[1].

## METHODOLGY

The Restoration Diagnostic Assessment Tool is a three step process for developing strategies for successful landscape restoration:

- Users define the scope or geographic boundary within which to apply the diagnostic such as urban reserve forest, open space reserve, parks etc.

- Users conduct an assessment to identify which key success factors are in place and which are not, within the landscape being considered for restoration.

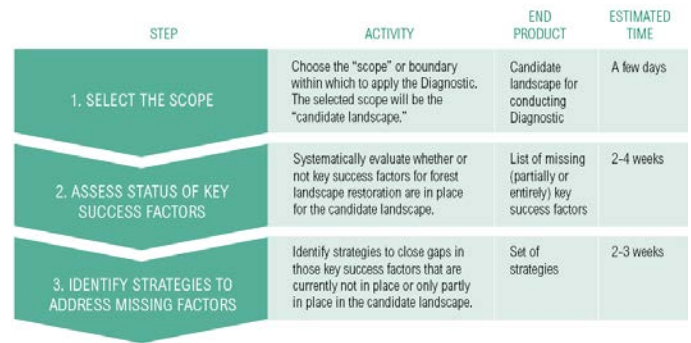- Users identify which policies, incentives, and practices would address the missing factor.

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**Figure 1 : Steps to conduct Restoration Diagnostics. Source: (World Resource Institute and IUCN)**

When applied prior to initiating a restoration process. The Restoration Diagnostic Tool can help decision makers and stakeholders focus their efforts on getting the missing key success factors in place – before large amounts of human, financial, or political capital area invested. When the findings are applied periodically as landscape restoration is in effect through adaptive management. As, a result application of the diagnostic may increase the likelihood of the forest landscape restoration will be successful[2].

[1] . Literature review reveals that the above factors were in place where restoration has occurred in various countries during the past.

[2] . The Restoration Diagnostics : A Method for developing forest landscape restoration strategies by rapidly assessing the status of Key Success Factors (Version1.0) Page-6

## STUDY AREA, ANALYSIS AND RESULTS

### About the study area and its features

The Nanmangalam urban reserve forest is selected as the candidate landscape for forest landscape resoration is located in southern part of Chennai measures 321 hectares with central coordinate as 12 degree 55'43"N and 80 degree 10'30"E. The habitat comprise of hillocks, plains with scrub vegetation, abandoned stone quarries, two fresh water ponds, Eucalyptus plantations by the Department of Forests -Tamil Nadu State, seasonal flood plains and Tamil Nadu State Greening and Biodiversity centre. The soil type is red loamy and rocky,Average annual rainfall range between 1200 mm to 1500 mm, with an annual average precipitation of 1317.3mm, Decadal temperature ranges between 20degree centigrade and 45 degree centigrade,with an annual mean temperature of 28.6 degree centigrade,tropical dry evergreen forest type.

**Figure 2 :Location Map of Nanmangalam urban reserve forest ,Chennai**



**Figure 3 : A) A view of the dense scrub forest; B) Forest boundary and the expanding city; C) Seasonally flooding ecalyptus plantation; D) Abandoned stone qaurry in the forest.** (Photo courtesy: Prabakaran Nehru)

## Analysis

Field trips were made during a eight weeks period to get the questionaire answered about the Nanmangalam urban reserve forest from the community and stakeholders to key in the format of the Excel-base tool "key success factors"questions for each category (motivate,enable,implement) of forest landscape restoration. The record of clarifiying comments, information, or data are filled in the spreadsheet . This information helps to justify,responses, serve as reminder of underlying rationale,or highlight where significant data gap exist. As the quetionaire tabs are completed, response automatically appear on the summary table.Thus revealing the measures to be taken care or adopted for the selected candidate landscape for forest landscape resoration.

## Results

The results are show in the below (Table 1) for the Nanmangalam urban reserve forest landscape restoration. **Diagnostic – Motivate:** Benefits are greater in prospect, Awareness and crisis events are not present, Legal requirements do partly exist, but not enforced. **Diagnostic – Enable:** Basic Ecological parameters are greater in prospect except invasive plants and animals that can impede restoration. Market conditions for forest products are declining, value chain absent. Policy conditions are present but can be improvised. Social Conditions on people participation has to be strengthened, social benefits are great in prospect. Institutional conditions are not present. **Diagnostic – Implement:** Leadership potential exist in abundance from various NGO's, Corporate and Major Industries as corporate social responsibility activity but Knowledge, Technical design, Finance and incentives and Feedback do not exist.

## CONCLUSIONS

Thus to conclude based on the results the relevant strategies are detailed as follows: **Diagnostic – Motivate:** Awareness program; Crisis event adaptation, mitigation and management techniques; Forest law amendment should be motivated at greater level. **Diagnostic – Enable:** Forest law; rural extension; research and development; sustainable forest intensification; Markets; Forest Policy amendment; Institutions participation and involvement to be enabled and encouraged. **Diagnostic – Implement:** Awareness Program; Innovation; Research and Development; rural extension; Forest law amendment; sustainable forest intensification; finance and promotional activities; spatial planning and monitoring to be implemented.

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**Table 1.Restoration Diagnostic results for Nanmangalam urban reserve forest**

| RESTORATION DIAGNOSTIC SUMMARY TABLE | | | |
|---|---|---|---|
| **GREEN= IN PLACE** | | | |
| YELLOW= PARTLY IN PLACE | | | |
| RED= NOT IN PLACE | | | |
| **Theme** | **Feature** | **Key success factor** | **Response** |
| Motivate | a. Benefits | Restoration generates economic benefits | Yes |
| | | Restoration generates social benefits | Yes |
| | | Restoration generates environmental benefits | Yes |
| | b. Awareness | Benefits of restoration are publicly communicated | No |
| | | Opportunities for restoration are identified | No |
| | c. Crisis events | Crisis events are leveraged | No |
| | d. Legal requirements | Law requiring restoration exists | Yes |
| | | Law requiring restoration is broadly understood and enforced | No |
| | | | |
| Enable | e. Ecological conditions | Soil, water, climate, and fire conditions are suitable for restoration | Yes |
| | | Plants and animals that can impede restoration are absent | No |
| | | Native seeds, seedlings, or sources populations are readily available | Yes |
| | f. Market conditions | Competing demands (e.g., food, fuel) for degraded forestlands are declining | Yes |
| | | Value chains for products from restored areas exists | No |
| | g. Policy conditions | Land and natural resource tenure are secure | No |
| | | Policies affecting restoration are aligned and streamlined | No |
| | | Restrictions on clearing remaining natural forests exist | Yes |
| | | Forest clearing restrictions are enforced | Yes |
| | h. Social conditions | Local people are empowered to make decisions about restoration | No |
| | | Local people are able to benefit from restoration | Yes |
| | i. Institutional conditions | Roles and responsibilities for restoration are clearly defined | No |
| | | Effective institutional coordination is in place | No |
| | | | |
| Implement | j. Leadership | National and/or local restoration champions exist | Yes |
| | | Sustained political commitment exists | No |
| | k. Knowledge | Restoration "know how" relevant to candidate landscapes exist | No |
| | | Restoration "know how" transferred via peers or extension services | No |
| | l. Technical design | Restoration design is technically grounded and climate resilient | No |
| | | Restoration limits "leakage" | No |
| | m. Finance and incentives | Positive incentives and funds for restoration outweigh negative incentives | No |
| | | Incentives and funds are readily accessible | No |
| | n. Feedback | Effective performance monitoring and evaluation system is in place | No |
| | | Early wins are communicated | No |

*Source: (PARISUTHA RAJAN ALPHONSE MARIANADIN,MINAKSHI JAIN, ABDUL RAZAK MOHAMED 23-01-2018)*

**Note   :** Restoration Diagnostic Summary Table for Nanmangalam urban reserve forest is prepared using The Restoration Diagnostic Assessment Tool.  Refer website :  www.wri.org/restorationdiagnostic